

Software Testing and Quality Assurance

Baolei Cheng(程宝雷)
chengbaolei@suda.edu.cn

- Something about this course
 - Academic degree course
 - English&Chinese teaching & learning
 - Some rules: attendance/homework/exercises
 - The references

考勤班长：钟晨瑗

考勤管理细则

Software Testing and Quality Assurance



The screenshot shows a web browser window with the address bar displaying the URL: <https://coursehome.zhihuishu.com/courseHome/1000002143?cpa...>. The page title is '《软件测试》' (Software Testing) and it is categorized under '计算机类 (0809)' (Computer Science (0809)).

The main content area features a large blue banner with the text '《软件测试》' and '计算机类 (0809)'. Below the banner, there is a section titled '课程介绍' (Course Introduction) with a button '申请学校选课' (Apply for school course selection). The course description states: '学习软件测试基础知识, 掌握软件测试应用技能, 了解软件测试的前沿发展' (Learn basic knowledge of software testing, master software testing application skills, and understand the frontier development of software testing).

The course details are listed as follows:

- 学分 (Credits): 1.0
- 学时 (Hours): 18.0
- 教师 (Instructor): 章晓芳, 程宝雷, 屈蕴茜
- 学校 (School): 苏州大学

Below the course details, there is a section for the textbook:

书名: 软件测试方法和技术 (...)
作者: 朱少民
出版社: 清华大学出版社
出版月份: 2014-10
教材编码: -

A button '了解更多' (Learn more) is located at the bottom right of the textbook section.

Software Testing and Quality Assurance

视频检查_智慧树

https://courseh5.zhihuishu.com/cc.html#/chapterVideo/1000002143/0/1?cparams=JTdCJTlyY291cnNISW

返回学堂 《软件测试》

课程主页 视频检查 题库 课程资料

3.1 白盒测试的基本概念

左下角【视频序号】按钮上有“●”的代表有反馈意见，有“●”的代表意见均处理完毕，有“●”的代表视频确认无误

全部视频确认无误

反馈记录 (2)



















[视频 00:05:17]
139****7865在2020-12-16 20:29提交
这边520的20应该是指数，代表5的20次方
处理结果：已处理
处理人：方圆
再次反馈

[视频 00:05:14]
139****7865在2020-11-06 20:37提交
520不对，20为上标，表示的意思是5的20次方
处理结果：已处理
处理人：方圆
再次反馈

57%
+ 3.6K/s

1.1 1.2 2.1.1 2.1.2 2.2.1 2.2.2 3.1 3.2.1 3.2.2 3.2.3 3.2.4
3.3.1 3.3.2 3.4 3.5.1 3.5.2 4.1.1 4.1.2 4.1.3 4.1.4 4.2.1 4.2.2

- The contents
 - Introduction of STQA
 - Basic concepts of ST
 - Testing methods: Wh
 - Testing phases: U-I-S
 - Testing report
 - Testing metrics

-  STQA_Session_01_Introduction
-  STQA_Session_02_Preliminary
-  STQA_Session_03_Logic coverage
-  STQA_Session_04_Control flow graph
-  STQA_Session_05_Basic path testing
-  STQA_Session_06_Loop testing&Data flow t...
-  STQA_Session_06-plus--Data flow testing
-  STQA_Session_07_BVA
-  STQA_Session_08_EP
-  STQA_Session_09_DT
-  STQA_Session_10_CEG
-  STQA_Session_11_CT
-  STQA_Session_12_UISA
-  STQA_Session_13_Regression testing
-  STQA_Session_14_Performance testing
-  STQA_Session_15_Bug report
-  STQA_Session_16_Testing metrics
-  STQA_Session_17_Testing management

- Score?
- Course objectives?
 - Application in graduation project
 - Publication of papers

Session 1

Introduction of Software Quality Assurance and Software Testing

Objectives

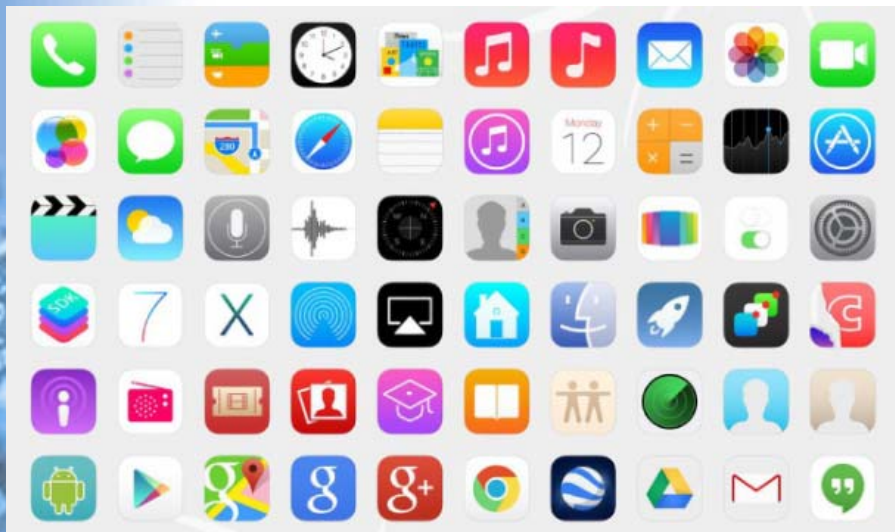
◆ In this session, you will learn:

- ◆ The basic idea of SQA
- ◆ Quality assurance and quality control
- ◆ Testing overview

◆ Why we need software testing?

Software Testing and Quality Assurance

◆ We need software



软件的组成部分有哪些? ()

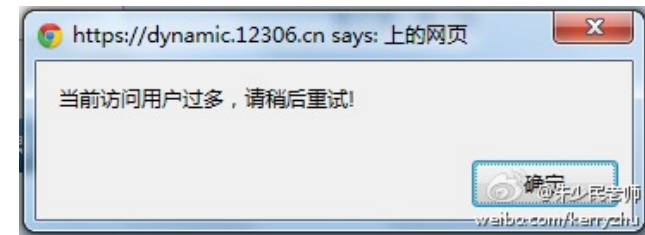
- A. 计算机程序
- B. 计算机程序和文档
- C. 计算机程序和规程
- D. 计算机程序、规程以及可能的相关文档和运行计算机系统所需的数据

◆ We need software of good quality

08奥运票务中心、12306的道歉



2007年10月30日，北京奥运会第二阶段门票销售刚启动就因为购票者太多而被迫暂停。低估了群众购票的热情，导致售票系统出现了瓶颈问题



一个缺陷造成了数亿美元损失

$$(4195835 / 3145727) \times 3145727 - 4195835 = ?$$



最后 **Intel** 公司付出很大代价，回收**CPU**，造成**4**亿美元损失

波音737 MAX 软件故障



1900年

— 庚子鼠年
— 农历初一

1月

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31					

2月

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	

3月

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	30
31		

4月

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

5月

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31				

6月

1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20
21	22
23	24
25	26
27	28
29	30

7月

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

8月

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	

9月

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

10月

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31					

11月

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24
25	26	27
28	29	30

12月

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

今天

日历

收件箱

晚上7:30

4G

< 评论: 徽商银行

全部

好评(8)

差评(49)

斗登陆不上

★★★★★

我小鱼 11-22 3.3.6版本

不怎么好用

★★★★★

用户31713 11-19 3.3.6版本

真不知道给差评的人是怎么弄的，我用着都挺好，功能都很精致，恶意攻击在秀人品下限还是根本就是人品太差？

★★★★★

吃猪侠 10-08 3.3.5版本

垃圾，转账之后，钱到了，却没有当天的记录，看不放当天的转账记录啊，竟然要延迟2天才有，所有银行也只有徽商银行这样吧。

★★★★★

松林海浪 09-15 3.3.4版本

垃圾，这就是在浪费时间，

★★★★★

月儿 09-14 3.3.4版本

太垃圾

★★★★★

卓寒 07-31 3.3.3版本

评论

评论

- ◆ We need some methods to ensure the quality

软件错误

在软件生命周期内不希望或不可接受的人为错误，结果导致软件缺陷的产生

软件缺陷

缺陷存在于软件及相关的文档中，在特定的条件下会使软件产生故障

软件故障

软件处于一种不希望或不可接受的内部状态，不及时处理就会使软件失效

软件失效

软件处于一种不希望或不可接受的外部状态

- ❑ 软件中存在的缺陷给我们带来的损失是巨大的，这也说明了软件测试的必要性和重要性
- ❑ 测试是所有工程学科的基本组成单元，自然也是软件开发的重要组成部分
- ❑ 测试人员水平越高，找到软件问题的时间就越早，软件就越容易更正，产品发布之后越稳定，收益越大

Software Testing and Quality Assurance



Dog and Testing

微信号: QualityReport

- Eating your own dog food, *Dogfooding*
- 自己公司使用自己开发的产品
 - 1988 年，微软的高管 Paul Maritz 在写给测试主管的一封信中

故事1:二战期间，美国空军降落伞的合格率为99.9%，这就意味着从概率上来说，每一千个跳伞的士兵中会有一个因为降落伞不合格而丧命。军方要求厂家必须让合格率达到100%才行，厂家负责人说他们竭尽全力了，99.9%已是极限，除非出现奇迹，军方就改变了检查制度，要求厂家负责人亲自跳伞检测。从此，奇迹出现了，降落伞的合格率达到百分

都吃一罐自己公司的狗粮。

- 二战期间降落伞
- 百度无人车

李彦宏 - 百度百科



职业：百度董事长兼首席执行官

生日：1968年11月17日

主要成就：发明超链分析技术并获美国专利，商业周刊2006年全球最...

简介：李彦宏 (Robin Li)，男，汉族，无党派人士，1968年...

人物经历 社会兼职 社会活动 出版图书 荣誉成就 更多 >

百度百科

Software Testing and Quality Assurance

Fundamentals of Software Quality Assurance

- ◆ Quality is defined as the degree of excellence of a software.
- ◆ Quality can be interpreted as meeting the following customer requirements:
 - ◆ Explicit
 - ◆ External: features, usability
 - ◆ Implicit
 - ◆ Internal: maintainability, user experience

Software Testing and Quality Assurance

Introducing Software Quality Assurance

- ◆ To ensure quality in the software development process, you need to implement software quality assurance activities in **each phase** of the Software Development Life Cycle (SDLC).
- ◆ SQA is a **planned** and **systematic** approach for **monitoring and improving** the software development process.
- ◆ SQA processes evaluate the **adherence** of a software product to software product standards.

Software Testing and Quality Assurance

Introducing Software Quality Assurance (Contd.)

- ◆ SQA Activities in Various Phases of the SDLC:
 - ◆ Software conception and initiation
 - ◆ Analysis
 - ◆ Design
 - ◆ Construction
 - ◆ Testing

Software Testing and Quality Assurance

Introducing Software Quality Assurance (Contd.)

- ◆ To ensure that the quality assurance objectives are met, a project **SQA** (P11) **plan** is created.
 - ◆ A part of comprehensive project plan
 - ◆ Specifies the QA procedure
 - ◆ Assigns roles and responsibilities
- ◆ Plan-Do-Check-Action

- ◆ Quality activities can be segmented into two categories:
 - ◆ Preventive activities
 - ◆ Detective activities

Software Testing and Quality Assurance

Quality Assurance and Quality Control

- ◆ QA is oriented to the **prevention** of defects rather than their detection and is used to implement the defined quality policy of an organization **through the process** of development and continuous improvement.

Software Testing and Quality Assurance

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Assurance (QA) activities include:
 - ◆ Quality Audit
 - ◆ Process definition
 - ◆ Tool selection
 - ◆ Training
 - ◆ Peer review
 - ◆ Requirements tracking
 - ◆ Quality metrics collection
 - ◆ ...

Software Testing and Quality Assurance

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Control (QC) is the process by which the quality of a product is **compared with specific standards**, and action is taken if the quality does not match the applicable standards.
- ◆ QC is oriented to **detection** of defects rather than prevention.

Software Testing and Quality Assurance

Quality Assurance and Quality Control (Contd.)

- ◆ QC activities include:

- ◆ Inspection

- ◆ Testing

- ◆ Checkpoint review

- ◆ ...

- ◆ QA VS. QC

Software Testing and Quality Assurance

Testing Overview

- ◆ What is testing ?
- ◆ Who does testing ?
- ◆ When to Start testing ?
- ◆ When to Stop testing ?
- ◆ 5W+1H

◆ What is testing ?

According to ANSI/IEEE 1059 standard, Testing can be defined as

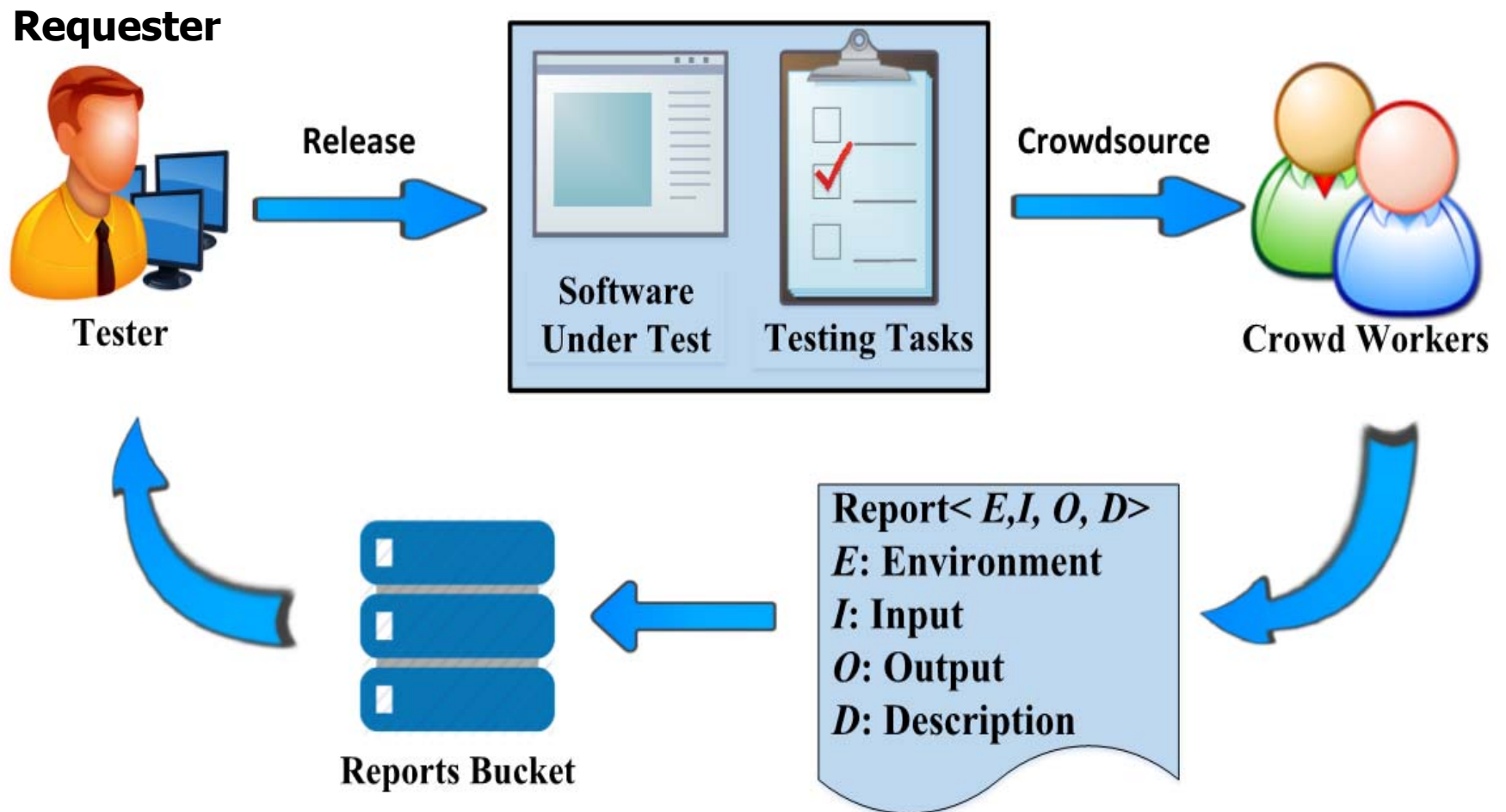
*A process of analyzing a **software item** to **detect** the differences between existing and required conditions (that is defects/errors/bugs...) and to **evaluate** the features of the software item.*

Testing is everywhere

Testing Overview

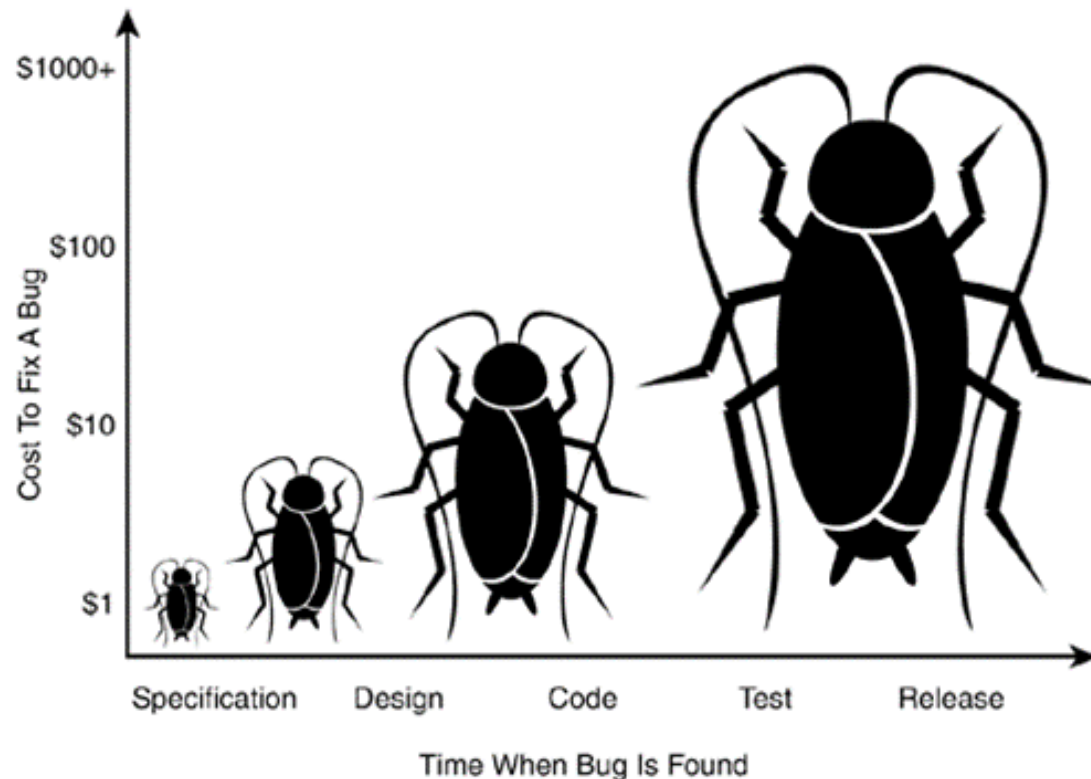
- ◆ **Who does testing ?**
 - ◆ **Software Tester**
 - ◆ **Software Developer**
 - ◆ **Project Lead/Manager**
 - ◆ **End User**
- ◆ **Crowdsourcing Testing**
 - ◆ **Anyone—crowd worker**

Crowdsourcing Testing(众包测试)



Testing Overview

- ◆ When to Start Testing ?
 - ◆ The earlier, the better



Testing Overview

- ◆ **When to Start Testing ?**
 - ◆ **The earlier, the better**
 - ◆ **Depends on the development model**
 - ◆ **Waterfall model vs. incremental model**
 - ◆ **Testing is done in different forms at every phase of SDLC**

- ◆ **When to Stop Testing ?**
 - ◆ **Testing is a never ending process**
 - ◆ **Some aspects**
 - Testing Deadlines.**
 - Completion of test case execution.**
 - Completion of functional and code coverage to a certain point.**
 - Bug rate falls below a certain level and no high priority bugs are identified.**
 - Management decision.**

Software Testing and Quality Assurance

Summary

- ◆ The need of SQA & Testing
- ◆ The basic idea of SQA
- ◆ Difference between quality assurance and quality control
- ◆ Testing overview

◆ A question:

Testing is a subset of quality assurance or
quality control?